The final annealing operation is to allow any subsequent sizing operations and, in the case of 9 and 14 ct gold alloys, remove the risk of stress corrosion.

A modification has been made to the containers in which the compacts are sintered. The long sintering times resulted in some loss of zinc from the zinc-containing carat gold alloys which, in turn, led to slight over-caratage of the rings. By putting a loose-fitting lid onto the containers the problem was effectively eliminated. The containers themselves have a few holes drilled in the sides to allow water to enter during the quenching operation after sintering.

CONCLUDING REMARKS

The press and sinter technique has now enjoyed nearly three full years of use at Engelhard-CLAL and, in the period up to August 2000, over 500,000 carat gold rings had been produced.

While the technique is a very simple and straightforward example of the use of powder metallurgy in producing net-shape products, it is believed to be the first time that it has been used in the mass production of gold jewellery. The technique is widely applicable to carat gold alloys while the rings themselves have significant hardness and ductility benefits compared with conventionally-produced rings, largely due to the fine grain size.

The overall process yields of greater than 85% compare extremely favourably with yields of about 30% for conventional rings and bring a range of economic benefits by reducing metal financing, recycling, refining and labour costs.

ACKNOWLEDGEMENTS

It is a pleasure to acknowledge the contribution to this development made by a number of staff at Engelhard-CLAL, particularly Terry Taylor, and to thank Mr Akin Akintola, Business Support Director at Engelhard-CLAL UK Ltd, for his permission to write this paper.
Figure 15 is reprinted with permission from Metal Powder Industries Federation, 105 College Road East, Princeton, New Jersey, USA.

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